SEQUENCE LISTING

SEQ ID NO: 1: Nucleotide sequence of 11.5 kb PCR product amplified from chromosomal DNA of *C. jejuni* OH4384 which includes *LOS* biosynthesis locus

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   1 aaagaatacg aatttgctaa agaggtttta aatcttagtg gtattgatga aacacatata
  61 gaattagcgc caaaatttaa tcttgaagag ctaatggctt ttacaaaaat gatggatctt
 121 atcataggaa atgatagcgg tccaacacat ttagcttttg ctttaaataa agcatctatt
 181 acgatttttg gtgcaacacc aagctaccgc aatgcttttc aaactcatat caataaaatc
 241 attgatacag gtaaaaaaat ccaaaatgcc aagcatatcg ataaaagtga tttttgtatc
 301 acgcgtatag aagaagaaga tatcttcaaa cttgccaaag gcttacttaa tgaaaaatag
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 421 ttgtatcttg catttttag ctttgattgt agcaagaatc gcttttcatc ttaacaaaaa
 481 acaccgcaaa atcatcaata caaatttgca aatctgtttt cctcaataca ctcaaaaaga
 541 acgcgataaa ttgtctttaa aaatttatga aaattttgct caatttggga ttgattgttt
 601 gcaaaatcaa aacaccacca aagaaaaaat tctcaataaa gtaaatttca tcaatgaaaa
 661 ttttcttata gatgccctgg ctttaaagcg tcctattatc ttcacaactg cacactatgg
 721 aaactgggaa attttaagcc ttgcttatgc ggctaaatat ggtgcgattt ccatagtggg
 781 aaaaaagtta aaaagtgaag ttatgtatga aattttaagc caaagtcgca cccaatttga
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 901 gagagctttg ggaattttaa ctgatcaaga ctgcgtagaa aacgaaagcg taagattaaa
 961 atttttaac aaagaagtga attatcaaat gggagcaagc cttatcgcac aaagaagcaa
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1321 gatgaaatta ttttacttaa caatgaaagt agcgataata ccctaaaaat agctaatgaa
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1441 ttaaaaaatc ttgctttaag ttatgcaaaa aatgattgga ttttaagcat tgatgctgat
1501 gaagtgcttg aaaatgagtg tattaaagag cttaaaaatt taaaacttca agaagataat
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SEQ ID NO: 1 (cont'd)

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1741 aagcattatt cttataagga tatctctcac ttaattgaca aaatgcagta ctactcaagt
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2401 tatcgcataa tttttaataa aaaagatttt aaaagttcta aaaattcttt tttagctaaa
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2521 aggtattagg ggttgcaata tgagtttttt taaaactgat tttgatgaac ttgatggttt
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2821 tgtagaaaaa tatttaagag aatgtttaga tagcgttatc aatcaaactt atactaactt
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2941 atatacctta aaagataaaa gaataactct ttttgataag aaaaatgggg gtttaagttc
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3181 ttaccctagt atagattata ttatattctt agatagtgat aattattgga aactaaactg
3241 catagaagaa tgcgttataa gaatgaaaaa tgtggatgta ttgtggtttg accatgattg
3301 cacctatgaa gacaatataa aaaataagca caaaaaaaca aggatggaaa tttttgattt
3361 taaaaaagaa tgtataatca ctccaaaaga atatgcaaat cgagcattaa gtgtaggatc
3421 tagagatatt tcttttggat ggaatggaat gattgatttt aatttttaa agcaaattaa
3481 acttaaattt ataaatttta ttatcaatga agatatacac tttgggataa ttttgtttgc
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SEQ ID NO: 1 (cont'd)

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3661 tatatatgaa actttcgggg aaaacgctaa ggaagcaaaa aattatttaa aagcagcaag
3721 cagggttata actgctttaa aattgataga atttttaaa gatcaaaaaa acgaaaatgc
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3901 aacaaaactt ccttatgata tttggaaatt ttggcaaaaa ataaaaaata tttaataata
3961 aaaatataaa aaattaatta atttttaggt ataatcacta taattatagg agaaaatatt
4021 ttatatgcta tttcaatcat actttgtgaa aataatttgc ttattcatcc cttttagaaa
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4141 ttcttattta ccaaaaaaaa ctcttgtgca aattaataaa tacaacaatg aagatttaat
4201 taaacttaat aaagctatta taggggaggg gcataaagga tattttaatt atgatgaaaa
4261 atctaaagat ccaaaatctc ctttgaatcc ttgggctttt atacgagtaa aaaatgaagc
4321 tattaccttа aaagcttctc ttgaaagcat attgcctgct atccaaagag gtgttatagg
4381 atataatgat tgtaccgatg gaagtgaaga aataattcta gaattttgca aacaatatcc
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4501 aaataaactc tatagctatt ataattatgt tgcaagtttt ataccaaaag atgagtggct
4561 tataaaaata gatgtggatc atatctatga tgctaaaaaa ctttataaaa gcttctatat
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4681 taatttttt ctttgtaaag ataataatgg caatatattg aaagaaccag gagattgctt
4741 gcttatcaat aattataact taaaatggaa agaagtatta attgacagaa tcaataacaa
4801 ttggaaaaaa gcaacaaaac aaagtttttc ttcaaatata cactctttag agcaattaaa
4861 gtataaacac aggatattat ttcacactga attaaataat tatcattttc ctttttaaa
4921 aaaacataga gctcaagata tttataaata taattggata agtattgaag aatttaaaaa
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5101 ttaaaatatt tattttagct aataatgtaa ccattaattt tgttcttttt attttatata
5161 tttgaatata tagcaaatat ttaattagca catagagaac gctacaatac ttgtttaaaa
5221 tataattttg ccttaaatag tttaaaacca actgcaactc ttgaatatta tttttaacaa
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5341 agttcatata tgctattttt tgagcttgac ttaacattgg ataatataac aatacatctt
5401 cagccatatt gattttaaca tctttctcga gtcttaaact cgcaaaagct tctaaataca
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SEQ ID NO: 1 (cont'd)

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5581 taacattact ttcaacaata gcattgaaaa acactaaatc aacttcatcc tgttcatcta
5641 aaatttttat acactcttca caagcattta gttccaaata atcatcagga tctaaaaaca
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6421 atttcaatca aagaattacc tcaggggtct atatgtgtgc agtagccata gccctaggat
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7261 gtgcaaaccg cttagaagat atgggagtta gtgcttttaa gattggttca ggtgagtgta
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SEQ ID NO: 1 (cont'd)

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7501 acgctatgct tgaattaaaa aaagaatttt cttgtatggt aggcttaagc gaccacacaa
7561 cagataatct tgcgtgttta ggtgcggttg cacttggtgc ttgtgtgctt gaaagacatt
7621 ttactgatag tatgcataga agtggccctg atatagtttg ttctatggat acacaggctt
7681 taaaagagct tattatacaa agtgagcaaa tggctataat gagaggaaat aatgaaagta
7741 aaaaagcagc taagcaagag caagtcacaa ttgattttgc ctttgcaagc gtagtcagca
7801 ttaaagatat taaaaaaggc gaagttttat ctatggataa tatttgggtt aaaagacctg
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7921 atatagaaaa tgatactcag ttaagctatg aggattttgc gtgaaaaaaa tccttttttat
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9181 gcactaaata ctaaaagcat tagtaaagtt gttgtaagca gtgatagtga tgaaatttta
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SEQ ID NO: 1 (cont'd)

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9421 aatctttata aaaatagcaa tgcaaatgcc ctaattagcg taagcgaatg tgataataaa
9481 attctaaaag cctttgtttg taatgaatat ggcgatttag cagggatttg taatgatgaa
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11101 aaaaacatta taaaatcaga actagaatgc aaaaccccca aatttctact tgcaaaagtg
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SEQ ID NO: 1 (cont'd)

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11221 accatattta aactattatc tttactttta tcatcgataa tcaaaatttc aatatctttt
11281 aaagtctgat ttatacaact ttgcaaagct cttgagataa aatcgcaaga attaaaaagc
11341 gggattatga tagaaagttg tggcatattt ttcctaaatt ttgttaaaat aataaaaaca
11401 attctatcaa agtttaggaa atttatgaaa atttttatac accttccaac ctggttaggc
11461 gatacggtaa tggc
```

SEQ ID NO: 2: Nucleotide sequence that encodes bifunctional sialyltransferase *cstII* from *C. jejuni* strain OH4384 (ORF 7a of *LOS* biosynthesis locus)

```
ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA   50
TTATTCAAGA CTACCAAATG ATTTTGATGT ATTTAGATGT AATCAATTTT  100
ATTTTGAAGA TAAATACTAT CTTGGTAAAA AATGCAAGGC AGTATTTTAC  150
AATCCTATTC TTTTTTTTGA ACAATACTAC ACTTTAAAAC ATTTAATCCA  200
AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT TACAACCAAG  250
CTCATCTAGA AAATGAAAAT TTTGTAAAAA CTTTTTACGA TTATTTTCCT  300
GATGCTCATT TGGGATATGA TTTTTTCAAA CAACTTAAAG ATTTTAATGC  350
TTATTTTAAA TTTCACGAAA TTTATTTCAA TCAAAGAATT ACCTCAGGGG  400
TTTATATGTG TGCAGTAGCC ATAGCCCTAG GATACAAAGA AATTTATCTT  450
TCGGGAATTG ATTTTTATCA AAATGGGTCA TCTTATGCTT TTGATACTAA  500
ACAAAAAAAT CTTTTAAAAT TGGCTCCTAA TTTTAAAAAT GATAATTCAC  550
ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTTCTA  600
GAAAAAACTT ACAAAATAAA ACTATATTGC TTATGTCCTA ACAGTCTTTT  650
AGCAAATTTT ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC  700
AAGAAAAAAA TAACTACACT AAAGATATAC TCATACCTTC TAGTGAGGCT  750
TATGGAAAAT TTTCAAAAAA TATTAATTTT AAAAAAATAA AAATTAAAGA  800
AAATATTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA CCTAGTGATA  850
TAAAGCATTA TTTCAAAGGA AAATAA                            876
```

SEQ ID NO: 3: Amino acid sequence of bifunctional sialyltransferase *CstII* from *C. jejuni* strain OH4384 (encoded by ORF 7a of *LOS* biosynthesis locus)

```
                10         20         30         40         50
  1 MKKVIIAGNG PSLKEIDYSR LPNDFDVFRC NQFYFEDKYY LGKKCKAVFY
 51 NPILFFEQYY TLKHLIQNQE YETELIMCSN YNQAHLENEN FVKTFYDYFP
101 DAHLGYDFFK QLKDFNAYFK FHEIYFNQRI TSGVYMCAVA IALGYKEIYL
151 SGIDFYQNGS SYAFDTKQKN LLKLAPNFKN DNSHYIGHSK NTDIKALEFL
201 EKTYKIKLYC LCPNSLLANF IELAPNLNSN FIIQEKNNYT KDILIPSSEA
251 YGKFSKNINF KKIKIKENIY YKLIKDLLRL PSDIKHYFKG K
```

SEQ ID NO: 4. Nucleotide sequence of bifunctional sialyltransferase-encoding *cstII* (ORF7a) from *LOS* biosynthesis locus of *C. jejuni* serotype O:10

```
ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA   50
TTATTCAAGG CTACCAAATG ATTTTGATGT ATTTAGATGC AATCAATTTT  100
ATTTTGAAGA TAAATACTAT CTTGGTAAAA AATTCAAAGC AGTATTTTAC  150
AATCCTGGTC TTTTTTTTGA ACAATACTAC ACTTTAAAAC ATTTAATCCA  200
AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT TACAACCAAG  250
CTCATCTAGA AAATGAAAAT TTTGTAAAAA CTTTTTACGA TTATTTTCCT  300
GATGCTCATT TGGGATATGA TTTTTTTAAA CAACTTAAAG AATTTAATGC  350
TTATTTTAAA TTTCACGAAA TTTATCTCAA TCAAAGAATT ACCTCAGGAG  400
TCTATATGTG TGCAGTAGCT ATAGCCCTAG GATACAAAGA AATTTATCTT  450
TCTGGAATTG ATTTTTATCA AAATGGGTCA TCTTATGCTT TTGATACCAA  500
ACAAGAAAAT CTTTTAAAAC TGGCTCCTGA TTTTAAAAAT GATCGCTCAC  550
ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTTCTA  600
GAAAAAACTT ACAAAATAAA ACTATATTGC TTATGTCCTA ACAGTCTTTT  650
AGCAAATTTT ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC  700
AAGAAAAAAA TAACTACACT AAAGATATAC TCATACCTTC TAGTGAGGCT  750
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TATGGAAAAT TTTCAAAAAA TATTAATTTT AAAAAAATAA AAATTAAAGA  800
AAATATTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA CCTAGTGATA  850
TAAAGCATTA TTTCAAAGGA AAATAA                            876
```

SEQ ID NO: 5. Amino acid sequence of bifunctional sialyltransferase *cstII* encoded by ORF 7a of *LOS* biosynthesis locus from *C. jejuni* serotype O:10

```
               10         20         30         40         50
  1 MKKVIIAGNG PSLKEIDYSR LPNDFDVFRC NQFYFEDKYY LGKKFKAVFY
 51 NPGLFFEQYY TLKHLIQNQE YETELIMCSN YNQAHLENEN FVKTFYDYFP
101 DAHLGYDFFK QLKEFNAYFK FHEIYLNQRI TSGVYMCAVA IALGYKEIYL
151 SGIDFYQNGS SYAFDTKQEN LLKLAPDFKN DRSHYIGHSK NTDIKALEFL
201 EKTYKIKLYC LCPNSLLANF IELAPNLNSN FIIQEKNNYT KDILIPSSEA
251 YGKFSKNINF KKIKIKENIY YKLIKDLLRL PSDIKHYFKG K
```

SEQ ID NO: 6. Nucleotide sequence of *C. jejuni* serotype O:41 *cstII* coding region

```
ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA   50
TTATTCAAGA CTACCAAATG ATTTTGATGT ATTTAGATGC AATCAATTTT  100
ATTTTGAAGA TAAATACTAT CTTGGTAAAA AATGCAAAGC AGTATTTTAC  150
AATCCTAGTC TTTTTTTTGA ACAATACTAC ACTTTAAAAC ATTTAATCCA  200
AAATCAAGAA TATGAGACCG AACTAATCAT GTGTTCTAAT TTTAACCAAG  250
CTCATCTAGA AAATCAAAAT TTTGTAAAAA CTTTTTACGA TTATTTTCCT  300
GATGCTCATT TGGGATATGA TTTTTTCAAA CAACTTAAAG AATTCAATGC  350
TTATTTTAAA TTTCACGAAA TTTATTTCAA TCAAAGAATT ACCTCAGGGG  400
TCTATATGTG CACAGTAGCC ATAGCCCTAG GATACAAAGA AATTTATCTT  450
TCGGGAATTG ATTTTTATCA AAATGGATCA TCTTATGCTT TTGATACCAA  500
ACAAAAAAAT CTTTTAAAAT TGGCTCCTAA TTTTAAAAAT GATAATTCAC  550
ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTTCTA  600
GAAAAAACTT ACGAAATAAA GCTATATTGT TTATGTCCTA ACAGTCTTTT  650
AGCAAATTTT ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC  700
AAGAAAAAAA TAACTATACT AAAGATATAC TCATACCTTC TAGTGAGGCT  750
TATGGAAAAT TTACAAAAAA TATTAATTTT AAAAAAATAA AAATTAAAGA  800
AAATATTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA CCTAGTGATA  850
TAAAGCATTA TTTCAAAGGA AAATAA                            876
```

SEQ ID NO: 7. Amino acid sequence of *CstII* from *C. jejuni* serotype O:41

```
               10         20         30         40         50
  1 MKKVIIAGNG PSLKEIDYSR LPNDFDVFRC NQFYFEDKYY LGKKCKAVFY
 51 NPSLFFEQYY TLKHLIQNQE YETELIMCSN FNQAHLENQN FVKTFYDYFP
101 DAHLGYDFFK QLKEFNAYFK FHEIYFNQRI TSGVYMCTVA IALGYKEIYL
151 SGIDFYQNGS SYAFDTKQKN LLKLAPNFKN DNSHYIGHSK NTDIKALEFL
201 EKTYEIKLYC LCPNSLLANF IELAPNLNSN FIIQEKNNYT KDILIPSSEA
251 YGKFTKNINF KKIKIKENIY YKLIKDLLRL PSDIKHYFKG K
```

SEQ ID NO: 8. Nucleotide sequence of coding region for *CstII* from *C. jejuni* O:19.

```
  1 atgaaaaaag ttattattgc tggaaatgga ccaagtttaa aagaaattga
 51 ttattcaagg ctaccaaatg attttgatgt atttagatgt aatcaatttt
101 attttgaaga taaatactat cttggtaaaa aatgcaaagc agtgttttac
151 acccctaatt tcttctttga gcaatactac actttaaaac atttaatcca
201 aaatcaagaa tatgagaccg aactaattat gtgttctaat tacaaccaag
251 ctcatctaga aaatgaaaat tttgtaaaaa ctttttacga ttattttcct
301 gatgctcatt tgggatatga ttttttttaaa caacttaaag aatttaatgc
351 ttattttaaa tttcacgaaa tttatttcaa tcaaagaatt acctcagggg
401 tctatatgtg tgcagtagcc atagccctag gatacaaaga aatttatctt
451 tcgggaattg atttttatca aaatgggtca tcttatgctt ttgataccaa
501 acaagaaaat cttttaaaac tagcccctga ttttaaaaat gatcgctcgc
551 actatatcgg acatagtaaa aatacagata taaaagcttt agaatttcta
601 gaaaaaactt acaaaataaa actatattgc ttatgtccta atagtctttt
651 agcaaatttt atagaactag cgccaaattt aaattcaaat tttatcatac
701 aagaaaaaaa taactacact aaagatatac tcataccttc tagtgaggct
751 tatggaaaat tttcaaaaaa tattaatttt aaaaaaataa aaattaaaga
801 aaatgtttat tacaagttga taaaagatct attaagatta cctagtgata
851 taaagcatta tttcaaagga aaataa
```

SEQ ID NO: 9: Amino acid sequence of *CstII* from *C. jejuni* O:19.

```
  1 MKKVIIAGNG PSLKEIDYSR LPNDFDVFRC NQFYFEDKYY LGKKCKAVFY
 51 TPNFFFEQYY TLKHLIQNQE YETELIMCSN YNQAHLENEN FVKTFYDYFP
101 DAHLGYDFFK QLKEFNAYFK FHEIYFNQRI TSGVYMCAVA IALGYKEIYL
151 SGIDFYQNGS SYAFDTKQEN LLKLAPDFKN DRSHYIGHSK NTDIKALEFL
201 EKTYKIKLYC LCPNSLLANF IELAPNLNSN FIIQEKNNYT KDILIPSSEA
251 YGKFSKNINF KKIKIKENVY YKLIKDLLRL PSDIKHYFKG K
```

SEQ ID NO: 10. Amino acid sequence of *CstII* from *C. jejuni* strain NCTC 11168

```
                10         20         30         40         50
  1 MSMNINALVC GNGPSLKNID YKRLPKQFDV FRCNQFYFED RYFVGKDVKY
 51 VFFNPFVFFE QYYTSKKLIQ NEEYNIENIV CSTINLEYID GFQFVDNFEL
101 YFSDAFLGHE IIKKLKDFFA YIKYNEIYNR QRITSGVYMC ATAVALGYKS
151 IYISGIDFYQ DTNNLYAFDN NKKNLLNKCT GFKNQKFKFI NHSMACDLQA
201 LDYLMKRYDV NIYSLNSDEY FKLAPDIGSD FVLSKKPKKY INDILIPDKY
251 AQERYYGKKS RLKENLHYKL IKDLIRLPSD IKHYLKEKYA NKNR
```

SEQ. ID NO: 11. Nucleotide sequence for coding region for Cst II from C. jejuni 0:4

```
  1   ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA TTATTCAAGG
 61   CTACCAAATG ATTTTGATGT ATTTAGATGT AATCAATTTT ATTTTGAAGA TAAATACTAT
121   CTTGGTAAAA AATGCAAAGC AGTGTTTTAC ACCCCTGGTT TCTTCTTTGA GCAATACTAC
181   ACTTTAAAAC ATTTAATCCA AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT
241   TACAACCAAG CTCATCTAGA AAATGAAAAT TTTGTAAAAA CTTTTTACGA TTATTTTCCT
301   GATGCTCATT TGGGATATGA TTTTTTTAAA CAACTTAAAG AATTTAATGC TTATTTTAAA
361   TTTCACGAAA TTTATTTCAA TCAAAGAATT ACCTCAGGGG TCTATATGTG TGCAGTAGCC
421   ATAGCCCTAG GATACAAAGA AATTTATCTT TCGGGAATTG ATTTTTATCA AAATGGGTCA
481   TCTTATGCTT TTGATACCAA ACAAGAAAAT CTTTTAAAAC TAGCCCCTGA TTTTAAAAAT
541   GATCGCTCAC ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTTCTA
```

601 GAAAAAACTT ACAAAATAAA ACTATATTGC TTATGTCCTA ACAGTCTTTT AGCAAATTTT
661 ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC AAGAAAAAAA TAACTACACT
721 AAAGATATAC TCATACCTTC TAGTGAGGCT TATGGAAAAT TTTCAAAAAA TATTAATTTT
781 AAAAAAATAA AAATTAAAGA AAATGTTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA
841 CCTAGTGATA TAAAGCATTA TTTCAAAGGA AAA

SEQ ID NO: 12. Amino acid sequence of Cst II from C. jejuni 0:4

MKKVIIAGNG PSLKEIDYSR LPNDFDVFRC NQFYFEDKYY LGKKCKAVFY TPGFFFEQY
YTLKHLIQNQ EYETELIMCS NYNQAHLENE NFVKTFYDYF PDAHLGYDFF KQLKEFNAY
FKFHEIYFNQ RITSGVYMCA VAIALGYKEI YLSGIDFYQN GSSYAFDTKQ ENLLKLAPD
FKNDRSHYIG HSKNTDIKAL EFLEKTYKIK LYCLCPNSLL ANFIELAPNL NSNFIIQEK
NNYTKDILIP SSEAYGKFSK NINFKKIKIK ENVYYKLIKD LLRLPSDIKH YFKGK

SEQ ID NO: 13. Nucleotide sequence for coding region for Cst II from C. jejuni 0:36

ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA TTATTCAAGG
CTACCAAATG ATTTTGATGT ATTTAGATGT AATCAATTTT ATTTTGAAGA TAAATACTAT
CTTGGTAAAA AATGCAAAAC AGTGTTTTAC ACCCCTAATT TCTTCTTTGA GCAATACTAC
ACTTTAAAAC ATTTAATCCA AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT
TACAACCAAG CTCATCTAGA AAATGAAAAT TTTGTAAAAA CTTTTTACGA TTATTTTCCT
GATGCTCATT TGGGATATGA TTTTTTTAAA CAACTTAAAG AATTTAATGC TTATTTTAAA
TTTCACGAAA TTTATTTCAA TCAAAGAATT ACCTCAGGGG TCTATATGTG TGCAGTAGCC
ATAGCCCTAG GATACAAAGA AATTTATCTT TCGGGAATTG ATTTTTATCA AAATGGGTCA
TCTTATGCTT TTGATACCAA ACAAGAAAAT CTTTTAAAAC TAGCCCCTGA TTTTAAAAAT
GATCGCTCAC ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTTCTA
GAAAAAACTT ACAAAATAAA ACTATATTGC TTATGTCCTA ATAGTCTTTT AGCAAATTTT
ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC AAGAAAAAAA TAACTACACT
AAAGATATAC TCATACCTTC TAGTGAGGCT TATGGAAAAT TTTCAAAAAA TATTAATTTT
AAAAAAATAA AAATTAAAGA AAATGTTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA
CCTAGTGATA TAAAGCATTA TTTCAAAGGA AAA

SEQ ID NO: 14. Amino acid sequence of Cst II from C. jejuni 0:36.

MKKVIIAGNG PSLKEIDYSR LPNDFDVFRC NQFYFEDKYY LGKKCKTVFY TPNFFFEQY
YTLKHLIQNQ EYETELIMCS NYNQAHLENE NFVKTFYDYF PDAHLGYDFF KQLKEFNAY
FKFHEIYFNQ RITSGVYMCA VAIALGYKEI YLSGIDFYQN GSSYAFDTKQ ENLLKLAPD
FKNDRSHYIG HSKNTDIKAL EFLEKTYKIK LYCLCPNSLL ANFIELAPNL NSNFIIQEK
NNYTKDILIP SSEAYGKFSK NINFKKIKIK ENVYYKLIKD LLRLPSDIKH YFKGK

SEQ ID NO: 15: Nucleotide sequence of glycosyltransferase-encoding ORF 4a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

ATGAAGAAAA TAGGTGTAGT TATACCAATC TATAATGTAG AAAAATATTT 50
AAGAGAATGT TTAGATAGCG TTATCAATCA AACTTATACT AACTTAGAAA 100
TCATACTTGT CAATGATGGT AGCACAGATG AACACTCACT CAATATTGCA 150
AAAGAATATA CCTTAAAAGA TAAAAGAATA ACTCTTTTTG ATAAGAAAAA 200
TGGGGGTTTA AGTTCAGCTA GAAATATAGG TATAGAATAC TTTAGCGGGG 250
AATATAAATT AAAAAACAAA ACTCAACATA TAAAAGAAAA TTCTTTAATA 300
GAATTTCAAT TGGATGGTAA TAATCCTTAT AATATATATA AAGCATATAA 350
AAGCTCTCAA GCTTTTAATA ATGAAAAAGA TTTAACCAAT TTTACTTACC 400
CTAGTATAGA TTATATTATA TTCTTAGATA GTGATAATTA TTGGAAACTA 450
AACTGCATAG AAGAATGCGT TATAAGAATG AAAAATGTGG ATGTATTGTG 500
GTTTGACCAT GATTGCACCT ATGAAGACAA TATAAAAAAT AAGCACAAAA 550
AAACAAGGAT GGAAATTTTT GATTTTAAAA AAGAATGTAT AATCACTCCA 600

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AAAGAATATG CAAATCGAGC ATTAAGTGTA GGATCTAGAG ATATTTCTTT  650
TGGATGGAAT GGAATGATTG ATTTTAATTT TTTAAAGCAA ATTAAACTTA  700
AATTTATAAA TTTTATTATC AATGAAGATA TACACTTTGG GATAATTTTG  750
TTTGCTAGTG CTAATAAAAT TTATGTTTTA TCACAAAAGT TGTATTTGTG  800
TCGTTTAAGA GCAAACAGTA TATCAAATCA TGATAAGAAG ATTACAAAAG  850
CAAATGTGTC AGAGTATTTT AAAGATATAT ATGAAACTTT CGGGGAAAAC  900
GCTAAGGAAG CAAAAAATTA TTTAAAAGCA GCAAGCAGGG TTATAACTGC  950
TTTAAAATTG ATAGAATTTT TTAAAGATCA AAAAAACGAA AATGCACTTG 1000
CTATAAAAGA AACATTTTTA CCTTGCTATG CCAAAAAAGC TTTAATGATT 1050
AAAAAATTTA AAAAAGATCC TTTAAATTTA AAGGAACAAT TAGTTTTAAT 1100
TAAACCTTTT ATTCAAACAA AACTTCCTTA TGATATTTGG AAATTTTGGC 1150
AAAAAATAAA AAATATTTAA                                  1170
```

SEQ ID NO: 16: Nucleotide sequence of β1,4 GalNAc transferase-encoding ORF 5a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

```
ATGCTATTTC AATCATACTT TGTGAAAATA ATTTGCTTAT TCATCCCTTT   50
TAGAAAAATT AGACATAAAA TAAAAAAAAC ATTTTTACTA AAAAACATAC  100
AACGAGATAA AATCGATTCT TATTTACCAA AAAAAACTCT TGTGCAAATT  150
AATAAATACA ACAATGAAGA TTTAATTAAA CTTAATAAAG CTATTATAGG  200
GGAGGGGCAT AAAGGATATT TTAATTATGA TGAAAAATCT AAAGATCCAA  250
AATCTCCTTT GAATCCTTGG GCTTTTATAC GAGTAAAAAA TGAAGCTATT  300
ACCTTAAAAG CTTCTCTTGA AAGCATATTG CCTGCTATCC AAAGAGGTGT  350
TATAGGATAT AATGATTGTA CCGATGGAAG TGAAGAAATA ATTCTAGAAT  400
TTTGCAAACA ATATCCTTCA TTTATACCAA TAAAATATCC TTATGAAATT  450
CAAATTCAAA ACCCAAAATC AGAAGAAAAT AAACTCTATA GCTATTATAA  500
TTATGTTGCA AGTTTTATAC CAAAAGATGA GTGGCTTATA AAAATAGATG  550
TGGATCATAT CTATGATGCT AAAAAACTTT ATAAAAGCTT CTATATACCA  600
AAAAACAAAT ATGATGTAGT TAGTTATTCA AGGGTTGATA TTCACTATTT  650
TAATGATAAT TTTTTTCTTT GTAAAGATAA TAATGGCAAT ATATTGAAAG  700
AACCAGGAGA TTGCTTGCTT ATCAATAATT ATAACTTAAA ATGGAAAGAA  750
GTATTAATTG ACAGAATCAA TAACAATTGG AAAAAAGCAA CAAAACAAAG  800
TTTTTCTTCA AATATACACT CTTTAGAGCA ATTAAAGTAT AAACACAGGA  850
TATTATTTCA CACTGAATTA AATAATTATC ATTTTCCTTT TTTAAAAAAA  900
CATAGAGCTC AAGATATTTA TAAATATAAT TGGATAAGTA TTGAAGAATT  950
TAAAAAATTC TATTTACAAA ATATTAATCA TAAAATAGAA CCTTCTATGA 1000
TTTCAAAAGA AACTCTAAAA AAAATATTCT TAACATTGTT TTAA        1044
```

SEQ ID NO: 17: Amino acid sequence of β1,4 GalNAc transferase from *C. jejuni* strain OH4384 (encoded by ORF 5a of *LOS* biosynthesis locus)

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              10         20         30         40         50
  1 MLFQSYFVKI ICLFIPFRKI RHKIKKTFLL KNIQRDKIDS YLPKKTLVQI
 51 NKYNNEDLIK LNKAIIGEGH KGYFNYDEKS KDPKSPLNPW AFIRVKNEAI
101 TLKASLESIL PAIQRGVIGY NDCTDGSEEI ILEFCKQYPS FIPIKYPYEI
151 QIQNPKSEEN KLYSYYNYVA SFIPKDEWLI KIDVDHIYDA KKLYKSFYIP
201 KNKYDVVSYS RVDIHYFNDN FFLCKDNNGN ILKEPGDCLL INNYNLKWKE
251 VLIDRINNNW KKATKQSFSS NIHSLEQLKY KHRILFHTEL NNYHFPFLKK
301 HRAQDIYKYN WISIEEFKKF YLQNINHKIE PSMISKETLK KIFLTLF
```

SEQ. ID NO: 18. Nucleotide sequence of β-1,4-GalNAc transferase from C. jejuni 0:1.

ATGACTTTGT TTTATAAAAT TATAGCTTTT TTAAGATTGC TTAAAATTGA TAAAAAATTA
AAATTTGATA ATGAATATTT TTTAAACTTA AATAAAAAAA TCTACAATGA AAAGCATAAA
GGTTTTTTTG ATTTTGATCC AAACTCAAAA GATACAAAAT CTCCTTTAAA TCCATGGGCT
TTTATAAGAG TAAAAAATGA AGCCACTACT TTAAGAGTAT CACTTGAAAG TATGTTACCT
GCCATACAAA GAGGTGTTAT AGGATATAAT GATTGTACTG ATGGAAGTGA AGAAATTATT
TTGGAATTTT GCAAACAATA CCCTTCGTTT ATACCAGTAA AATATCCCCA TGAGGTGCAA
ATTGAAAATC CGCAAAGCGA AGAAAATAAA CTTCATAGTT ATTATAACTA TGTAGCTAGT
TTTATACCGC AAGATGAGTG GCTTATAAAA ATAGATGTGG ATCATTACTA TGATGCAAAA
AAATTATATA AGAGTTTTTA TATGGCATCA AAAAATACTG CTGTTAGATT TCCAAGAATT
AATTTTTTAA TACTAGATAA AATTGTAATT CAAAATATAG GAGAATGTGG TTTTATCGAT
GGAGGGGATC AATTGTTAAT TCAAAAGTGC AATAGTGTAT TTATAGAAAG AATGGTTTCA
AAGCAAAGTC AGTGGATTGA TCCTGAAAAA ACTGTGAAAG AATTGTATTC TGAACAGCAA
ATTATACCCA AACATATAAA AATCTTACAA GCAGAATTAC TTCAATGGCA TTTTCCTGCT
TTAAAATATC ATAGAAATGA TTATCAAAAA CATTTGGATG CTTTAACTTT AGAAGATTTT
AAAAAAATCC ATTATAGACA TAGAAAAATA AAGAAAATAA ATTATACAAT GCTTGATGAA
AAAGTAATTC GTGAAATATT AGATAAATTT AAATTGAGTG GTAAAAAAAT GACTTTAGCT
ATAATACCTG CTCGAGCTGG TTCAAAAGGT ATAAAAAATA AAAATTTAGC TCTTTTGCAT
GATAGGCCTT TGTTGTATTA TACTATCAAT GCAGCAAAAA ATTCAAAGTA TGTAGATAAA
ATTGTTTTAA GTAGTGATGG CGATGATATA TTAGAATATG GACAAACTCA AGGTGTAGAT
GTGTTAAAAA GACCTAAAGA ATTAGCGCTA GATGATACAA CTAGTGATAA GGTTGTATTG
CATACCTTGA GTTTTTATAA AGATTATGAA AATATTGTTT TATTACAACC CACTTCTCCT
TTAAGGACAA ATGTACATAT AGATGAAGCT TTTTTAAAAT TTAAAAATGA AAACTCAAAT
GCATTAATAA GTGTTGTAGA ATGTGATAAT AAAATTTTAA AAGCTTTTAT AGATGATAAT
GGTAACTTAA AAGGAATTTG TGATAACAAA TATCCATTTA TGCCTAGACA AAAATTACCA
AAAACTTATA TGAGTAATGG TGCAATTTAT ATAGTAAAGT CAAATTTATT TTTAAATAAC
CCAACTTTTC TACAAGAAAA AACAAGTTGC TATATAATGG ACGAAAAAGC TAGTTTGGAT
ATAGATACAA CAGAGGATTT AAAAAGAGTT AATAATATAA GCTTCTTA

SEQ. ID NO: 19. Amino Acid sequence of β-1,4-GalNAc transferase from C. jejuni 0:1.

MTLFYKIIAF LRLLKIDKKL KFDNEYFLNL NKKIYNEKHK GFFDFDPNSK DTKSPLNPW
AFIRVKNEAT TLRVSLESML PAIQRGVIGY NDCTDGSEEI ILEFCKQYPS FIPVKYPHE
VQIENPQSEE NKLHSYYNYV ASFIPQDEWL IKIDVDHYYD AKKLYKSFYM ASKNTAVRF
PRINFLILDK IVIQNIGECG FIDGGDQLLI QKCNSVFIER MVSKQSQWID PEKTVKELY
SEQQIIPKHI KILQAELLQW HFPALKYHRN DYQKHLDALT LEDFKKIHYR HRKIKKINY
TMLDEKVIRE ILDKFKLSGK KMTLAIIPAR AGSKGIKNKN LALLHDRPLL YYTINAAKN
SKYVDKIVLS SDGDDILEYG QTQGVDVLKR PKELALDDTT SDKVVLHTLS FYKDYENIV
LLQPTSPLRT NVHIDEAFLK FKNENSNALI SVVECDNKIL KAFIDDNGNL KGICDNKYP
FMPRQKLPKT YMSNGAIYIV KSNLFLNNPT FLQEKTSCYI MDEKASLDID TTEDLKRVNNI SFL

SEQ. ID NO: 20. Nucleotide sequence of β-1,4-GalNAc transferase from C. jejuni 0:10.

ATGCTATTTC AATCATACTT TGTGAAAATA ATTTGCTTAT TCATCCCTTT TAGAAAAATT
AGACATAAAA TAAAAAAAAC ATTTTTACTA AAAAACATAC AACGAGATAA AATCGATTCT
TATCTACCAA AAAAAACTCT TATACAAATT AATAAATACA ACAATGAAGA TTTAATTAAA
CTTAATAAAG CTATTATAGG GGGGGGGCAT AAAGGATATT TTAATTATGA TGAAAAATCT
AAAGATCCAA AATCTCCTTT GAATCCTTGG GCTTTTATAC GAGTAAAAAA TGAAGCTATT
ACCTTAAAAG CTTCTCTTGA AAGCATATTG CCTGCTATTC AAAGAGGTGT TATAGGATAT
AATGATTGCA CCGATGGAAG TGAAGAAATA ATTCTAGAAT TTTGCAAACA ATATCCTTCA
TTTATACCAA TAAAATATCC TTATGAAATT CAAATTCAAA ACCCAAAATC AGAAGAAAAT
AAACTCTATA GCTATTATAA TTATGTTGCA AGTTTTATAC CAAAAGATGA GTGGCTCATA
AAAATAGATG TGGATCATTA TTATGATGCA AAAAAATTAT ATAAGAGTTT TTATATACCT
AGAAAAAATT ATCATGTAAT TAGTTACTCT AGGATAGATT TTATATTTAA TGAAGAAAAA
TTTTATGTTT ATCGGAATAA GGAGGGGGAG ATTTTAAAAG CTCCTGGAGA TTGTTTAGCA
ATACAAAACA CTAACTTATT TTGGAAAGAA ATACTTATTG AAGATGATAC ATTTAAGTGG
AATACTGCAA AAAATAATAT AGAGAATGCA AAATCATATG AAATTTTAAA AGTTAGAAAT
AGAATTTATT TTACTACAGA ACTTAATAAT TATCATTTTC CATTTATAAA AAATTATAGA
AAAAATGATT ATAAGCAGTT AAATTGGGTT AGCTTAGATG ATTTTATTAA AAATTATAAA
GAAAAATTAA AAAATCAAAT AGATTTTAAA ATGCTAGAAT ACAAAACATT AAAAAAAGTG
TACAAAAAGC TTACATCTTC AGCAAGCGAT AAAATT

SEQ. ID NO: 21. Amino acid sequence of β-1,4-GalNAc transferase from C. jejuni 0:1.

MLFQSYFVKI ICLFIPFRKI RHKIKKTFLL KNIQRDKIDS YLPKKTLIQI NKYNNEDLI
KLNKAIIGGG HKGYFNYDEK SKDPKSPLNP WAFIRVKNEA ITLKASLESI LPAIQRGVI
GYNDCTDGSE EIILEFCKQY PSFIPIKYPY EIQIQNPKSE ENKLYSYYNY VASFIPKDE
WLIKIDVDHY YDAKKLYKSF YIPRKNYHVI SYSRIDFIFN EEKFYVYRNK EGEILKAPG
DCLAIQNTNL FWKEILIEDD TFKWNTAKNN IENAKSYEIL KVRNRIYFTT ELNNYHFPF
IKNYRKNDYK QLNWVSLDDF IKNYKEKLKN QIDFKMLEYK TLKKVYKKLT SSASDKI

SEQ. ID NO: 22. Nucleotide sequence of β-1,4-GalNAc transferase from C. jejuni 0:1. O:36

DNA:
ATGCTTAAAA AAATCATTTC TTTATATAAA AGATACTCGA TTTCTAAAAA ATTGGTTTTA
GATAATGAGC ATTTCATTAA GGAAAATAAA AACATCTATG GAAAAAAACA TAAGGGCTTT
TTTGACTTTG ATGAAAAGGC TAAGGATGTG AAATCACCCC TTAATCCTTG GGGATTTATC
AGGGTTAAAA ATGAAGCTTT AACCCTAAGA GTTTCTTTAG AAAGTATACT ACCTGCTTTA
CAAAGAGGAA TTATAGCTTA CAACGACTGT GATGATGGGA GTGAAGAGCT TATTTTAGAA
TTTTGCAAGC AATATCCCAA CTTCATTGCT AAAAAATATC CTTATAAAGT AGATCTAGAA
AATCCTAAAA ATGAAGAAAA TAAACTTTAC TCTTATTACA ATTGGGCAGC ATCTTTTATA
CCCTTAGATG AGTGGTTTAT AAAAATCGAT GTGGATCATT ACTACGATGC CAAGAAGCTT
TATAAGAGTT TTTATAGGAT TGATCAAGAA AATAAAGCCT TATGCTACCC AAGAATTAAT
TTTATAATCT TAAATGGAAA TATTTATGTG CAAAATAGTG GAAATTATGG ATTCATAGGG
GGGGGGGATC AACTCTTGAT TAAAAGAAGA AATAGTAGCT TTATAGAAAG AAGGGTTTCA A
AAAAAAGCCA ATGGATAGAT CCTAAGGGAC TTATAGAAGA ACTCTACTCC GAGCAACAAG
TCTTATCTCA AGGAGTGAAA ATACTACAAG CTCCCCTACT TCAGTGGCAT TTTCCTGCCT
TAAAATACCG CCGAAACGAT TACCAACAAT ATTTAGATAT CTTGAGTTTA GAAGAATTTC
AGGCCTTTCA TCGTAAGAGC AAAGAGGCTA AAAAAATAGA CTTTGCCATG CTAAAACGCC
CTGTAATCGA GCAAATATTA AAGAAATTTC AAGGAGAGAT AAAA

SEQ. ID NO: 23. Amino acid sequence of β-1,4-GalNAc transferase from C. jejuni 0:36.

MLKKIISLYK RYSISKKLVL DNEHFIKENK NIYGKKHKGF FDFDEKAKDV
KSPLNPWGFI RVKNEALTLR VSLESILPAL QRGIIAYNDC DDGSEELILE
FCKQYPNFIA KKYPYKVDLE NPKNEENKLY SYYNWAASFI PLDEWFIKID
VDHYYDAKKL YKSFYRIDQE NKALCYPRIN FIILNGNIYV QNSGNYGFIG
GGDQLLIKRR NSSFIERRVS KKSQWIDPKG LIEELYSEQQ VLSQGVKILQ
APLLQWHFPA LKYRRNDYQQ YLDILSLEEF QAFHRKSKEA KKIDFAMLKR
PVIEQILKKF QGEIK

SEQ. ID NO: 24. Nucleotide sequence of β-1,4-GalNAc transferase from C. jejuni NCTC11168

ATGACTTTGT TTTATAAAAT TATAGCTTTT TTAAGATTGC TTAAAATTGA TAAAAAATTA
AAATTTGATA ATGAATATTT TTTAAACTTA AATAAAAAAA TCTACGATGA AAAGCATAAA
GGTTTTTTTG ATTTTGATCC AAACTCAAAA GATACAAAAT CTCCTTTAAA TCCATGGGCT
TTTATAAGAG TAAAAAATGA AGCCACTACT TTAAGAGTAT CACTTGAAAG TATGTTACCT
GCCATACAAA GAGGTGTTAT AGGATATAAT GATTGTACTG ATGGAAGTGA AGAAATTATT
TTGGAATTTT GCAAACAATA CCCTTCGTTT ATACCAGTAA AATATCCCCA TGAGGTGCAA
ATTGAAAATC CGCAAAGCGA AGAAAATAAA CTTCATAGTT ATTATAACTA TGTAGCTAGT
TTTATACCGC AAGATGAGTG GCTTATAAAA ATAGATGTGG ATCATTACTA TGATGCAAAA
AAATTATATA AGAGTTTTTA TATGGCATCA AAAAATACTG CTGTTAGATT TCCAAGAATT
AATTTTTTAA TACTAGATAA AATTGTAATT CAAAATATAG GAGAATGTGG TTTTATCGAT
GGAGGGGATC AATTGTTAAT TCAAAAGTGC AATAGTGTAT TTATAGAAAG AATGGTTTCA

AAGCAAAGTC AGTGGATTGA TCCTGAAAAA ACTGTGAAAG AATTGTATTC TGAACAGCAA
ATTATACCCA AACATATAAA AATCTTACAA GCAGAATTAC TTCAATGGCA TTTTCCTGCT
TTAAAATATC ATAGAAATGA TTATCAAAAA CATTTGGATG CTTTAACTTT AGAAGATTTT
AAAAAAATCC ATTATAGACA TAGAAAAATA AAGAAAATAA ATTATACAAT GCTTGATGAA
AAAGTAATTC GTGAAATATT AGATAAATTT AAATTGAGTG GTAAAAAAAT GACTTTAGCT
ATAATACCTG CTCGAGCTGG TTCAAAAGGT ATAAAAAATA AAAATTTAGC TCTTTTGCAT
GATAGGCCTT TGTTGTATTA TACTATCAAT GCAGCAAAAA ATTCAAAGTA TGTAGATAAA
ATTGTTTTAA GTAGTGATGG CGATGATATA TTAGAATATG GACAAACTCA AGGTGTAGAT
GTGTTAAAAA GACCTAAAGA ATTAGCGCTA GATGATACAA CTAGTGATAA GGTTGTATTG
CATACCTTGA GTTTTTATAA AGATTATGAA AATATTGTTT TATTACAACC CACTTCTCCT
TTAAGGACAA ATGTACATAT AGATGAAGCT TTTTTAAAAT TTAAAAATGA AAACTCAAAT
GCATTAATAA GTGTTGTAGA ATGTGATAAT AAAATTTTAA AAGCTTTTAT AGATGATAAT
GGTAACTTAA AAGGAATTTG TGATAACAAA TATCCATTTA TGCCTAGACA AAAATTACCA
AAAACTTATA TGAGTAATGG TGCAATTTAT ATAGTAAAGT CAAATTTATT TTTAAATAAC
CCAACTTTTC TACAAGAAAA AACAAGTTGC TATATAATGG ACGAAAAAGC TAGTTTGGAT
ATAGATACAA CAGAGGATTT AAAAAGAGTT AATAATATAA GCTTCTTA

SEQ. ID NO: 25. Amino Acid sequence of β-1,4-GalNAc transferase from C. jejuni NCTC11168

MTLFYKIIAF LRLLKIDKKL KFDNEYFLNL NKKIYDEKHK GFFDFDPNSK DTKSPLNPW
AFIRVKNEAT TLRVSLESML PAIQRGVIGY NDCTDGSEEI ILEFCKQYPS FIPVKYPHE
VQIENPQSEE NKLHSYYNYV ASFIPQDEWL IKIDVDHYYD AKKLYKSFYM ASKNTAVRF
PRINFLILDK IVIQNIGECG FIDGGDQLLI QKCNSVFIER MVSKQSQWID PEKTVKELY
SEQQIIPKHI KILQAELLQW HFPALKYHRN DYQKHLDALT LEDFKKIHYR HRKIKKINY
TMLDEKVIRE ILDKFKLSGK KMTLAIIPAR AGSKGIKNKN LALLHDRPLL YYTINAAKN
SKYVDKIVLS SDGDDILEYG QTQGVDVLKR PKELALDDTT SDKVVLHTLS FYKDYENIV
LLQPTSPLRT NVHIDEAFLK FKNENSNALI SVVECDNKIL KAFIDDNGNL KGICDNKYP
FMPRQKLPKT YMSNGAIYIV KSNLFLNNPT FLQEKTSCYI MDEKASLDID TTEDLKRVNN ISFL

SEQ ID NO: 26: Nucleotide sequence of β1,3-galactosyltransferase-encoding ORF 6a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

ATGTTTAAAA TTTCAATCAT CTTACCAACT TATAATGTGG AACAATATAT 50
AGCAAGGGCA ATAGAAAGCT GTATCAATCA GACTTTTAAA GATATAGAAA 100
TAATTGTAGT TGATGATTGT GGAAATGATA ATAGTATAAA TATAGCCAAA 150
GAATACTCTA AAAAAGACAA AAGAATAAAA ATAATCCACA ATGAAAAAAA 200
CTTAGGTCTT TTAAGAGCAA GATATGAAGG TGTGAAAGTA GCAAACTCTC 250
CTTATATAAT GTTTTTAGAT CCTGATGATT ATTTGGAACT AAATGCTTGT 300
GAAGAGTGTA TAAAAATTTT AGATGAACAG GATGAAGTTG ATTTAGTGTT 350
TTTCAATGCT ATTGTTGAAA GTAATGTTAT TTCATATAAA AAGTTTGACT 400
TTAATTCTGG TTTTTATAGC AAAAAAGAGT TTGTAAAAAA AATTATTGCA 450
AAGAAAAATT TATATTGGAC TATGTGGGGG AAACTTATAA GAAAGAAATT 500
GTATTTAGAA GCTTTTGCGA GTTTAAGACT CGAGAAAGAT GTTAAAATCA 550
ATATGGCTGA AGATGTATTG TTATATTATC CAATGTTAAG TCAAGCTCAA 600
AAAATAGCAT ATATGAACTG TAATTTATAT CATTACGTGC CTAATAATAA 650
TTCAATTTGT AATACTAAGA ATGAAGTGCT TGTTAAAAAT AATATTCAAG 700
AGTTGCAGTT GGTTTTAAAC TATTTAAGGC AAAATTATAT TTTAAACAAG 750
TATTGTAGCG TTCTCTATGT GCTAATTAAA TATTTGCTAT ATATTCAAAT 800
ATATAAAATA AAAAGAACAA AATTAATGGT TACATTATTA GCTAAAATAA 850
ATATTTTAAC TTTAAAAATT TTATTTAAAT ATAAAAAATT TTTAAAACAA 900
TGTTAA 906

SEQ ID NO: 27 Amino acid sequence of β1,3-galactosyltransferase encoded by ORF 6a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

```
              10         20         30         40         50
  1 MFKISIILPT YNVEQYIARA IESCINQTFK DIEIIVVDDC GNDNSINIAK
 51 EYSKKDKRIK IIHNEKNLGL LRARYEGVKV ANSPYIMFLD PDDYLELNAC
101 EECIKILDEQ DEVDLVFFNA IVESNVISYK KFDFNSGFYS KKEFVKKIIA
151 KKNLYWTMWG KLIRKKLYLE AFASLRLEKD VKINMAEDVL LYYPMLSQAQ
201 KIAYMNCNLY HYVPNNNSIC NTKNEVLVKN NIQELQLVLN YLRQNYILNK
251 YCSVLYVLIK YLLYIQIYKI KRTKLMVTLL AKINILTLKI LFKYKKFLKQ
301 C
```

SEQ ID NO: 28. Nucleotide sequence of CgtB β1,3 galactosyltransferase from *C. jejuni* serotype O:2 (strain NCTC 11168).

```
ATGAGTCAAA TTTCCATCAT ACTACCAACT TATAATGTGG AAAAATATAT   50
TGCTAGAGCA TTAGAAAGTT GCATTAACCA AACTTTTAAA GATATAGAAA  100
TCATTGTAGT AGATGATTGT GGTAATGATA AAAGTATAGA TATAGCTAAA  150
GAGTATGCTA GTAAAGATGA TAGAATAAAA ATCATACATA ATGAAGAGAA  200
TTTAAAGCTT TTAAGAGCAA GATATGAAGG TGCTAAAGTA GCAACTTCAC  250
CTTATATCAT GTTTTTAGAT TCTGATGATT ATTTAGAACT TAATGCTTGC  300
GAAGAATGTA TTAAAATTTT GGATATGGGT GGGGGGGGTA AAATTGATTT  350
GTTGTGTTTT GAAGCTTTTA TTACCAATGC AAAAAAATCA ATAAAAAAAT  400
TAAATATAAA ACAAGGAAAA TACAACAACA AAGAATTTAC AATGCAAATA  450
CTTAAAACTA AAAATCCATT TTGGACAATG TGGGCTAAAA TAATCAAAAA  500
AGATATTTAT TTAAAAGCCT TCAACATGTT AAATCTCAAA AAAGAAATCA  550
AAATAAATAT GGCAGAAGAT GCCTTATTAT ATTATCCTTT GACAATATTA  600
TCTAATGAAA TATTTTACTT AACACAACCT TTGTATACCC AGCATGTAAA  650
TAGCAATTCT ATAACAAATA ATATTAATTC TTTAGAAGCT AATATTCAAG  700
AACATAAAAT TGTTTTAAAT GTTTTAAAAT CAATTAAAAA TAAAAAAACA  750
CCTCTATATT TTCTAATTAT ATATTTATTA AAAATTCAAT TATTGAAATA  800
TGAACAAAAT TTTAATAAAA GAAATATAAA TCTTATTTAT TATAAAATAA  850
ATATTTTATA TCAAAAATAT CAATTCAAAT GGAAAAAATT TTTATATAAT  900
TTAATTCCGT AA                                           912
```

SEQ ID NO: 29. Amino acid sequence of CgtB β1,3 galactosyltransferase from *C. jejuni* serotype O:2 (strain NCTC 11168).

```
              10         20         30         40         50
  1 MSQISIILPT YNVEKYIARA LESCINQTFK DIEIIVVDDC GNDKSIDIAK
 51 EYASKDDRIK IIHNEENLKL LRARYEGAKV ATSPYIMFLD SDDYLELNAC
101 EECIKILDMG GGGKIDLLCF EAFITNAKKS IKKLNIKQGK YNNKEFTMQL
151 KTKNPFWTMW AKIIKKDIYL KAFNMLNLKK EIKINMAEDA LLYYPLTILS
201 NEIFYLTQPL YTQHVNSNSI TNNINSLEAN IQEHKIVLNV LKSIKNKKTP
251 LYFLIIYLLK IQLLKYEQNF NKRNINLIYY KINILYQKYQ FKWKKFLYNL
301 IP
```

SEQ ID NO. 30: Nucleotide sequence of β-1,3-galactosyl transferase from C. jejuni O:10

```
ATGTTTAAAA TTTCAATCAT CTTGCCAACT TATAATGTGG AACAATATAT AGCAAGGGCA
ATAGAAAGTT GTATCAATCA GACTTTTAAA AATATAGAAA TAATTGTAGT TGATGATTGT
GGAAGTGACA AAAGTATAGA TATAGTTAAA GAATATGCCA AAAAAGATGA TAGAATAAAA
ATCATACATA ATGAAGAAAA TTTAAAACTT TTAAGAGCTA GATATGAAGG TGTAAAAGTA
GCAAACTCTC CTTATATAAT GTTTTTAGAT CCTGATGATT ATTTAGAACT TAATGCTTGT
GAAGAATGTA TGAAAATTTT AAAAAACAAT GAAATAGATT TATTATTTTT TAATGCATTT
GTATTGGAAA ATAACAATAA AATAGAAAGA AAGTTGAATT TTCAAGAAAA ATGTTATGTA
AAAAAAGATT TTTTAAAAGA ACTATTAAAA ACTAAAAATT TATTTTGGAC AGTGTGGGCA
AAAGTCATAA AAAAAGAATT ATATCTCAAG GCTGTTGGTT TAATATCGCT AGAAAATGCT
AAAATAAATA TGGCTGAAGA TGTTTTATTA TATTACCCTT TGATAAATAT TTCAAATACT
ATATTTCACT TGAGTAAAAA TTTATACAAT TATCAAATAA ATAATTTCTC TATAACCAAA
ACATTAACAT TGCAAAATAT AAAAACAAAT ATACAAGAAC AAGATAATGT TCTATATCTT
CTAAAGAAGA TGCAATATAA TTACAATTTT AACTTAACTT TGCTTAAATT AATTGAGTAT
TTTTTATTAA TTGAAAAATA CTCATTATCA AGCAAGCGAA ATGTTCTTTG TTTTAAAATC
AATATTTTTT TTAAAAAAAT CCAATTTAAA TTTTATCGCT TGCTGAAGAT G
```

SEQ ID NO. 31: Amino acid sequence of β-1,3-galactosyl transferase from C. jejuni O:10

```
MFKISIILPT YNVEQYIARA IESCINQTFK NIEIIVVDDC GSDKSIDIVK EYAKKDDRI
KIIHNEENLK LLRARYEGVK VANSPYIMFL DPDDYLELNA CEECMKILKN NEIDLLFFN
AFVLENNNKI ERKLNFQEKC YVKKDFLKEL LKTKNLFWTV WAKVIKKELY LKAVGLISL
ENAKINMAED VLLYYPLINI SNTIFHLSKN LYNYQINNFS ITKTLTLQNI KTNIQEQDN
VLYLLKKMQY NYNFNLTLLK LIEYFLLIEK YSLSSKRNVL CFKINIFFKK IQFKFYRLLK M
```

SEQ ID NO: 32. Amino acid sequence of lipid A biosynthesis acyltransferase (*C. jejuni* OH4384).

```
  1 MKNSDRIYLS LYYILKFFVT FMPDCILHFL ALIVARIAFH LNKKHRKIIN
 51 TNLQICFPQY TQKERDKLSL KIYENFAQFG IDCLQNQNTT KEKILNKVNF
101 INENFLIDAL ALKRPIIFTT AHYGNWEILS LAYAAKYGAI SIVGKKLKSE
151 VMYEILSQSR TQFDIELIDK KGGIRQMLSA LKKERALGIL TDQDCVENES
201 VRLKFFNKEV NYQMGASLIA QRSNALIIPV YAYKEGGKFC IEFFKAKDSQ
251 NASLEELTLY QAQSCEEMIK KRPWEYFFFH RRFASYNEEI YKGAK
```

SEQ ID NO: 33. Amino acid sequence of glycosyltransferase encoded by ORF 3a of *C. jejuni* OH4384 *LOS* locus.

```
  1 MNLKQISVII IVKNAEQTLL ECLNSLKDFD EIILLNNESS DNTLKIANEF
 51 KKDFANLYIY HNAFIGFGAL KNLALSYAKN DWILSIDADE VLENECIKEL
101 KNLKLQEDNI IALSRKNLYK GEWIKACGWW PDYVLRIFNK NFTRFNDNLV
151 HESLVLPSNA KKIYLKNGLK HYSYKDISHL IDKMQYYSSL WAKQNIHKKS
201 GVLKANLRAF WTFFRNYFLK NGFLYGYKGF IISVCSALGT FFKYMKLYEL
251 QRQKPKTCAL IIITYNQKER LKLVLDSVKN LAFLPNEVLI ADDGSKEDTA
301 RLIEEYQKDF PCPLKHIWQE DEGFKLSKSR NKTIKNADSE YIIVIDGDMI
351 LEKDFIKEHL EFAQRKLFLQ GSRVILNKKE SEEILNKDDY RIIFNKKDFK
401 SSKNSFLAKI FYSLSKKR
```

SEQ ID NO: 34. Amino acid sequence of glycosyltransferase encoded by ORF 4a of *C. jejuni* OH4384 *LOS* locus.

```
  1 MKKIGVVIPI YNVEKYLREC LDSVINQTYT NLEIILVNDG STDEHSLNIA
 51 KEYTLKDKRI TLFDKKNGGL SSARNIGIEY FSGEYKLKNK TQHIKENSLI
101 EFQLDGNNPY NIYKAYKSSQ AFNNEKDLTN FTYPSIDYII FLDSDNYWKL
151 NCIEECVIRM KNVDVLWFDH DCTYEDNIKN KHKKTRMEIF DFKKECIITP
201 KEYANRALSV GSRDISFGWN GMIDFNFLKQ IKLKFINFII NEDIHFGIIL
251 FASANKIYVL SQKLYLCRLR ANSISNHDKK ITKANVSEYF KDIYETFGEN
301 AKEAKNYLKA ASRVITALKL IEFFKDQKNE NALAIKETFL PCYAKKALMI
351 KKFKKDPLNL KEQLVLIKPF IQTKLPYDIW KFWQKIKNI
```

SEQ ID NO: 35. Amino acid sequence of sialic acid synthase encoded by ORF 8a of *C. jejuni* OH4384 *LOS* locus.

```
  1 MKEIKIQNII ISEEKAPLVV PEIGINHNG SLELAKIMVD AAFSTGAKII
 51 KHQTHIVEDE MSKAAKKVIP GNAKISIYEI MQKCALDYKD ELALKEYTEK
101 LGLVYLSTPF SRAGANRLED MGVSAFKIGS GECNNYPLIK HIAAFKKPMI
151 VSTGMNSIES IKPTVKILLD NEIPFVLMHT TNLYPTPHNL VRLNAMLELK
201 KEFSCMVGLS DHTTDNLACL GAVALGACVL ERHFTDSMHR SGPDIVCSMD
251 TQALKELIIQ SEQMAIMRGN NESKKAAKQE QVTIDFAFAS VVSIKDIKKG
301 EVLSMDNIWV KRPGLGGISA AEFENILGKK ALRDIENDTQ LSYEDFA
```

SEQ ID NO: 36. Amino acid sequence of enzyme involved in sialic acid biosynthesis encoded by ORF 9a of *C. jejuni* OH4384 *LOS* locus.

```
  1 MYRVQNSSEF ELYIFATGMH LSKNFGYTVK ELYKNGFKNI YEFINYDKYF
 51 STDKALATTI DGFSRYVNEL KPDLIVVHGD RIEPLAAAIV GALNNILVAH
101 IEGGEISGTI DDSLRHAISK LAHIHLVNDE FAKRRLMQLG EDEKSIFIIG
151 SPDLELLNDN KISLNEAKKY YDINYENYAL LMFHPVTTEI TSIKNQADNL
201 VKALIQSNKN YIVIYPNNDL GFELILQSYE ELKNNPRFKL FPSLRFEYFI
251 TLLKNADFII GNSSCILKEA LYLKTAGILV GSRQNGRLGN ENTLKVNANS
301 DEILKAINTI HKKQDLFSAK LEILDSSKLF FEYLQSGEFF KLNTQKVFKD
351 IK
```

SEQ ID NO: 37. Amino acid sequence of CMP-sialic acid synthetase encoded by ORF 10a of *C. jejuni* OH4384 *LOS* locus.

```
  1 MSLAIIPARG GSKGIKNKNL VLLNNKPLIY YTIKAALNTK SISKVVVSSD
 51 SDEILNYAKS QNVDILKRPI SLAQDNTTSD KVLLHALKFY KDYEDVVFLQ
101 PTSPLRTNIH IDEAFNLYKN SNANALISVS ECDNKILKAF VCNEYGDLAG
151 ICNDEYPFMP RQKLPKTYMS NGAIYILKIK EFLNNPSFLQ SKTKHFLMDE
201 SSSLDIDCLE DLKKAEQIWK K
```

SEQ ID NO: 38. Amino acid sequence of acetyltransferase encoded by ORF 11a of *C. jejuni* OH4384 *LOS* locus.

```
  1 MEKITLKCNK NILNLLKQYN IYTKTYIENP RRFSRLKTKD FITFPLENNQ
 51 LESVAGLGIE EYCAFKFSNI LHEMDSFSFS GSFLPHYTKV GRYCSISDGV
```

```
101 SMFNFQHPMD RISTASFTYE TNHSFINDAC QNHINKTFPI VNHNPSSSIT
151 HLIIQDDVWI GKDVLLKQGI TLGTGCVIGQ RAVVTKDVPP YAIVAGIPAK
201 IIKYRFDEKT IERLLKIQWW KYHFADFYDI DLNLKINQYL DLLEEKIIKK
251 SISYYNPNKL YFRDILELKS KKIFNLF
```

SEQ ID NO: 39. Amino acid sequence of glycosyltransferase encoded by ORF 12a of *C. jejuni* OH4384 *LOS* locus.

```
  1 MPQLSIIIPL FNSCDFISRA LQSCINQTLK DIEILIIDDK SKDNSLNMVL
 51 EFAKKDPRIK IFQNEENLGT FASRNLGVLH SSSDFIMFLD SDDFLTPDAC
101 EIAFKEMKKG FDLLCFDAFV HRVKTKQFYR FKQDEVFNQK EFLEFLSKQR
151 HFCWSVWAKC FKKDIILKSF EKIKIDERLN YGEDVLFCYI YFMFCEKIAV
201 FKTCIYHYEF NPNGRYENKN KEILNQNYHD KKKSNEIIKK LSKEFAHDEF
251 HQKLFEVLKR EEAGVKNRLK
```